

Name: \_\_\_\_\_

Per: \_\_\_\_\_

## Motion Lab 3 - What is Fast?

In this lab activity you are going to have one group member move using different motions. During their motion, the member moving will mark their location each second.

1. Have one student walk forward at a constant casual pace.



$t_0$	$t_1$	$t_2$	$t_3$	$t_4$	$t_5$	$t_6$	$t_7$
$d_{0-1}$ : _____	$d_{1-2}$ : _____	$d_{2-3}$ : _____	$d_{3-4}$ : _____	$d_{4-5}$ : _____	$d_{5-6}$ : _____	$d_{6-7}$ : _____	

- a. Determine the total distance walked over the seven seconds. Show your work.  $d_{\text{total}} =$  \_\_\_\_\_

- b. Determine the average distance walked each second. Show your work.  $d_{\text{average}} =$  \_\_\_\_\_

- c. Speed is considered a rate.

- i. A rate is a value that describes how much of one quantity there is per a second measured quantity. In this case, the rate describes how many meters a person travels per a time interval.

- ii. How many meters did the person travel (on average) per 1.0 second? \_\_\_\_\_

1. This means that every 1 second the person walking traveled \_\_\_\_\_ meters. Therefore, we say the person's speed is \_\_\_\_\_ meters per \_\_\_\_\_ second, or \_\_\_\_\_ m/s.

- iii. How many meters did the person travel (on average) per 2.0 seconds? \_\_\_\_\_

1. This means that every 2 seconds the person walking traveled \_\_\_\_\_ meters. Therefore, we say the person's speed is \_\_\_\_\_ meters per \_\_\_\_\_ seconds, or \_\_\_\_\_ m/s.

- iv. How many meters did the person travel (on average) per 3.0 seconds? \_\_\_\_\_

1. This means that every 3 seconds the person walking traveled \_\_\_\_\_ meters. Therefore, we say the person's speed is \_\_\_\_\_ meters per \_\_\_\_\_ seconds, or \_\_\_\_\_ m/s.

- d. No matter the time interval used, 1.0 seconds, 2.0 seconds or 3.0 seconds, the rate is the same, therefore, the speed is the same. This is because for each added second, the distance covered increased at an equal rate. It is the same as doing  $\frac{5}{1}$  or  $\frac{10}{2}$  or  $\frac{15}{3}$ , they all equal 5!

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2. Have one student walk forward at a constant fast pace.



$t_0$	$t_1$	$t_2$	$t_3$	$t_4$	$t_5$	$t_6$	$t_7$
$d_{0-1}:$ _____	$d_{1-2}:$ _____	$d_{2-3}:$ _____	$d_{3-4}:$ _____	$d_{4-5}:$ _____	$d_{5-6}:$ _____	$d_{6-7}:$ _____	

a. Determine the total distance walked over the seven seconds. Show your work.  $d_{\text{total}} =$  \_\_\_\_\_

b. Determine the average distance walked each second. Show your work.  $d_{\text{average}} =$  \_\_\_\_\_

c. Determine the speed of your motion in meters per second. Show your work.  $s =$  \_\_\_\_\_

3. Have one student run forward at a constant pace.



$t_0$	$t_1$	$t_2$	$t_3$	$t_4$	$t_5$	$t_6$	$t_7$
$d_{0-1}:$ _____	$d_{1-2}:$ _____	$d_{2-3}:$ _____	$d_{3-4}:$ _____	$d_{4-5}:$ _____	$d_{5-6}:$ _____	$d_{6-7}:$ _____	

a. Determine the total distance walked over the seven seconds. Show your work.  $d_{\text{total}} =$  \_\_\_\_\_

b. Determine the average distance walked each second. Show your work.  $d_{\text{average}} =$  \_\_\_\_\_

c. Determine the speed of your motion in meters per second. Show your work.  $s =$  \_\_\_\_\_

4. Describe what fast means in terms of distance and time.

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## How Far?

1. Because speed tells you how much distance is covered per time interval, it is easy to predict how far someone would go given their speed and how long they travel for. Complete the table below by determining the distance a the student would have been, had they continued their motion for the given time periods.

Motion	Speed (m/s)	8 sec	9 sec	10 sec	11 sec	12 sec	13 sec	14 sec	15 sec	16 sec	17 sec
Casual Walk											
Fast Walk											
Running											

- a. What are you adding to each second to determine the new distance?
- b. So to determine the distance something travels you simply have to add the speed for the desired time of movement. This can take a long time if you are traveling for any time more than five seconds!
- i. To make it faster we can simply multiply!

1. Example: If speed = 12 m/s how far would they travel after 8 seconds?

$$d = 12 + 12 + 12 + 12 + 12 + 12 + 12 + 12 = 96$$

or

$$d = 12 (8) = 96$$

How far would a dog run in 25 seconds if they ran at 8.2 m/s?

Given	Equation	Work / Picture	Answer
s = 8.2 m/s t = 25 sec d = ?	$s = \frac{d}{t}$	$8.2 \text{ m/s} = \frac{d}{25 \text{ s}} \quad 25 \text{ s} * 8.2 \text{ m/s} = \frac{d}{25 \text{ s}} * 25 \text{ s}$ $d = 25 \text{ s} * 8.2 \text{ m/s}$	<b>205 m</b>

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How far can you walk in 320 seconds?

Given	Equation	Work / Picture	Answer

How far could you run in 10 minutes if you kept the same speed the entire time?

Given	Equation	Work / Picture	Answer

How far could you walk in a class period (48 minutes) if you speed walked?

Given	Equation	Work / Picture	Answer